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INSTRUCTION IN FOUNDRY PRACTICE AT THE UNIVERSITY OF ILLINOIS.

By MR. D. T. RANDALL, Urbana, Ill.

The shops of the Mechanical Engineering Department, shown in cut number 1, contain a well-equipped machine shop, a forge shop, and the foundry. The foundry has a molding room 48x48 feet, with a 20x30 foot cupola room added on one side as a wing to the building. The walls are of brick, the windows are large and are placed about six feet from the floor. Light is also admitted from above through the clerestory windows, which are hinged and may be easily adjusted from the floor, an arrangement which provides for perfect ventilation. The cupola is a "Whiting No. 1"—lined to 22 inch inside diameter, and the blast is furnished by a No. 7 "Buffalo" blower. A brass furnace, manufactured by the "American Gas Furnace Co.," is installed at one side of the molding room, and near by is the brass molders' tub. The core oven is of brick, built into the cupola room with double doors opening into the molding room. It is 6x8x7 feet, and is provided with movable shelves for cores and dry-sand molds. A line shaft runs through the foundry and furnishes power to the blower, a grinding stand and a rattler. A "Pridmore' molding machine fitted with gear patterns furnishes a means of comparing hand molding with machine work. There is also a full supply of crucibles, ladles, tongs, flasks, brushes, and small tools. On the side opposite the cupola a molding bench extends along the wall. The larger work is bedded in the floor near the cupola.

It is the policy of the Mechanical Department to have some machine under process of construction each year, which will give the students good shop instruction and which when finished will add to the useful machines in the shop or laboratory. The

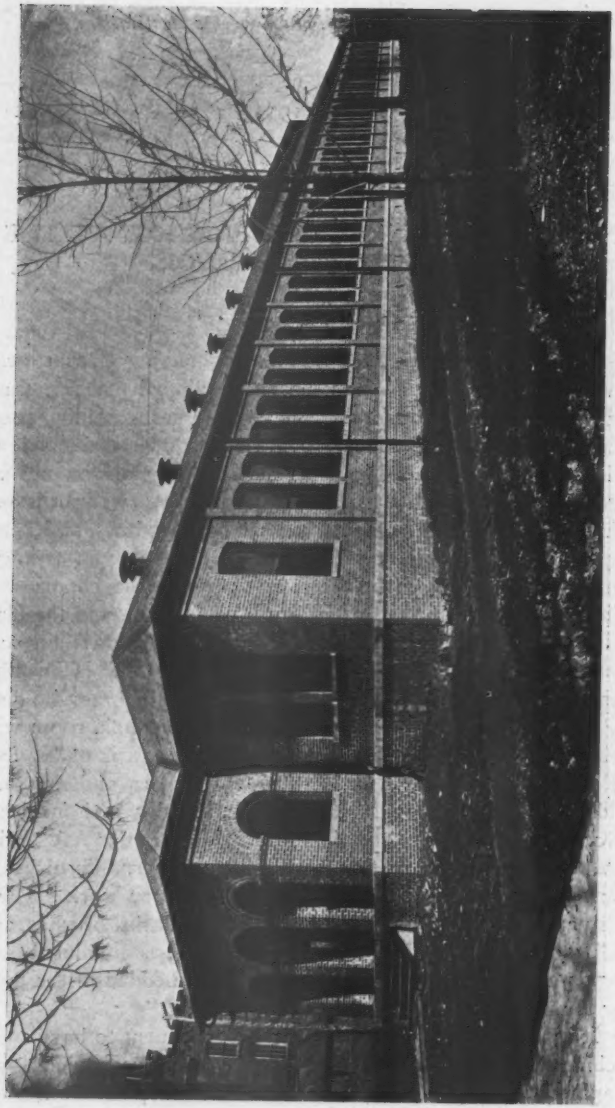


Fig. 1. Mechanical Engineering Department Shops.

boring mill shown in cut No. 2 was designed and built at the University Shops. At present a tandem compound steam engine, having a nominal rating of sixty-five horse power, is furnishing shop practice for the several departments. Cut No. 3 shows a collection of cores prepared for this engine, and cuts Nos. 4 and 5 show the high pressure cylinder and the fly wheel as they came from the molds. Cuts Nos. 6, 7 and 8 show methods used in molding the fly wheel in green and dry sand. This

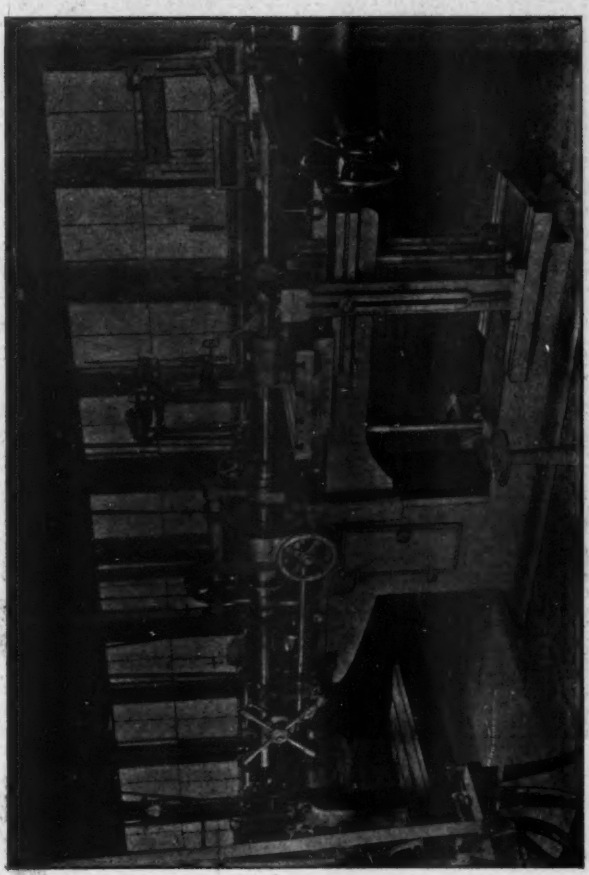


Fig. 2. Horizontal Boring Mill, designed and built in M. E. Dept. Shop.

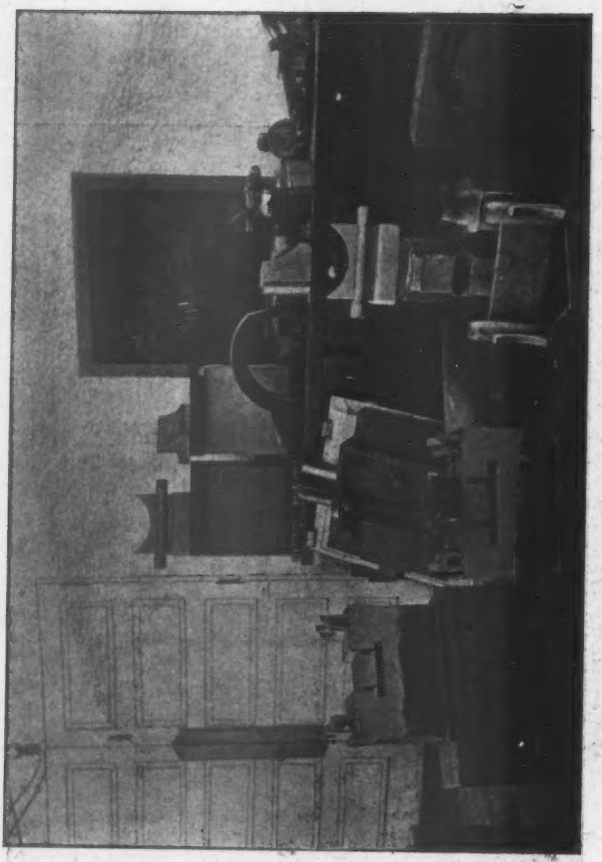


Fig. 3. Cores for High Pressure Cylinder 65 H. P. Tandem Compound Engine.

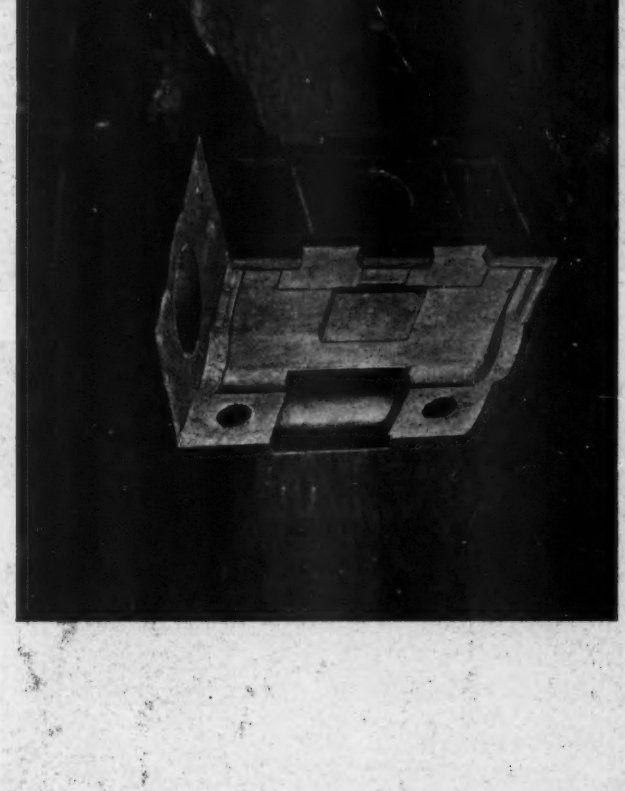


Fig. 4. High Pressure Cylinder.

Fig. 5. 72-inch Fly Wheel for Compound Engine.

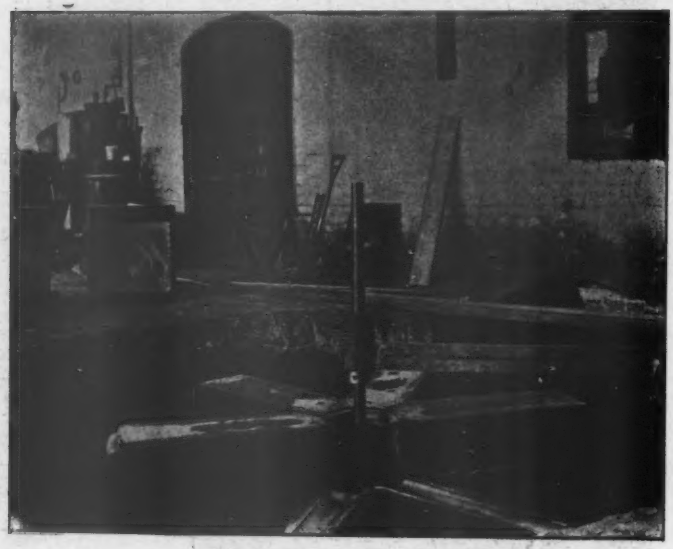
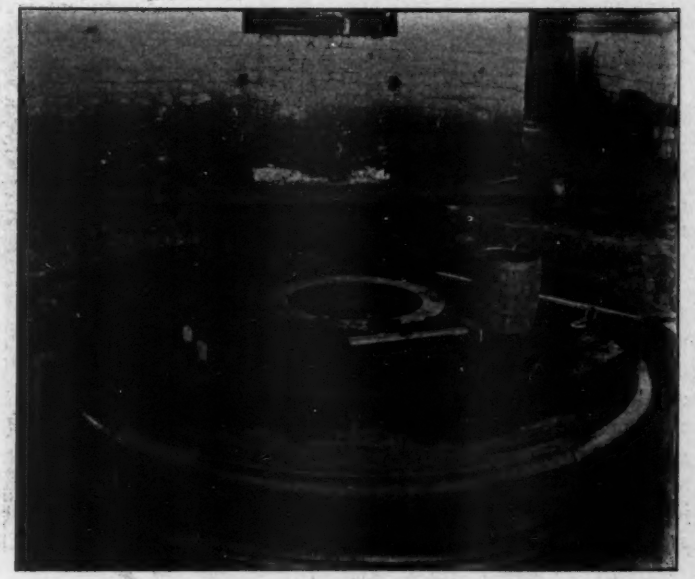


Fig. 6. Mold for Fly Wheel.

Fig. 7. Mold for Fly Wheel.



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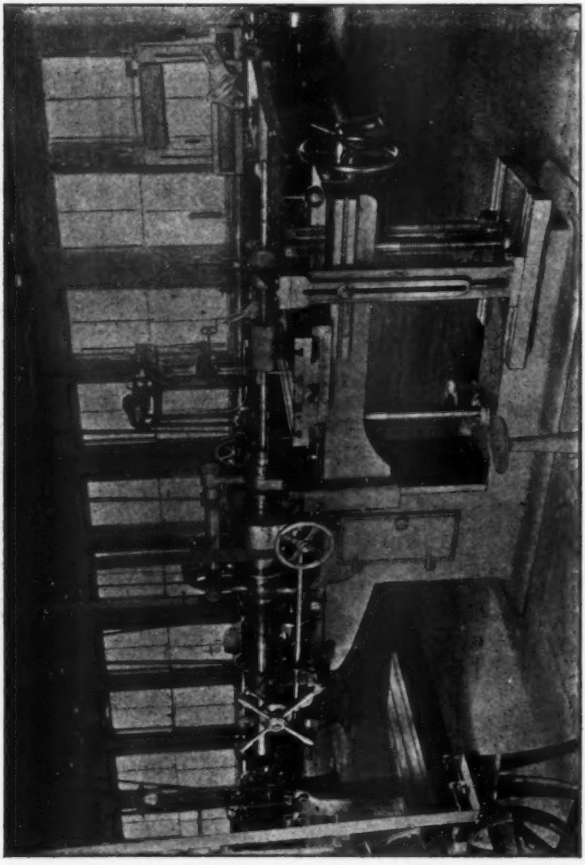

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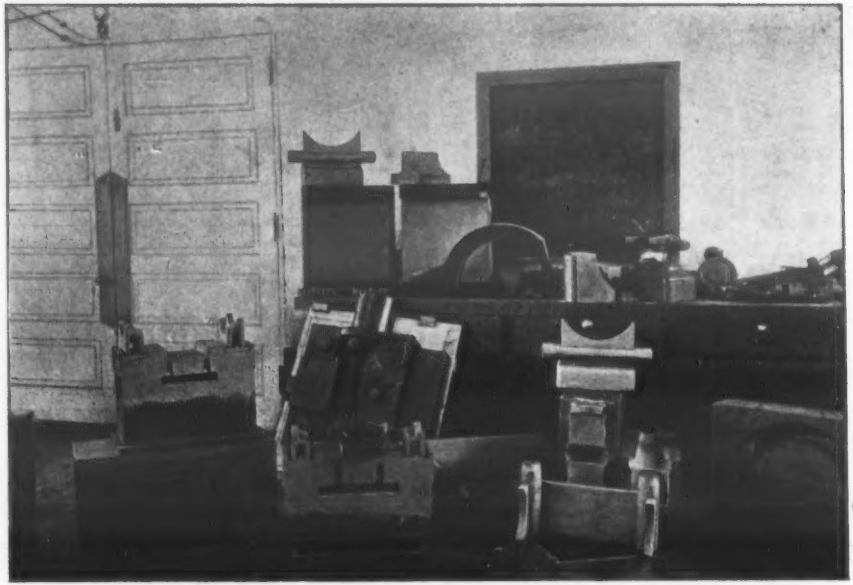

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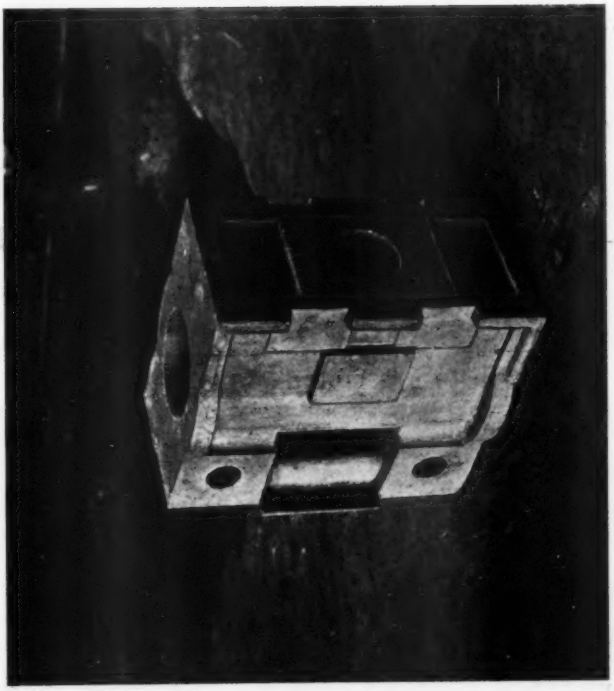

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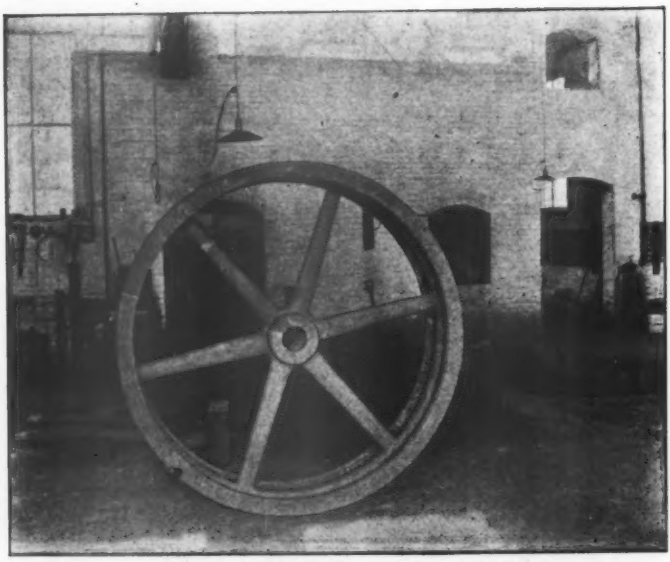

Fig. 5. 72-inch Fly Wheel for Compound Engine.

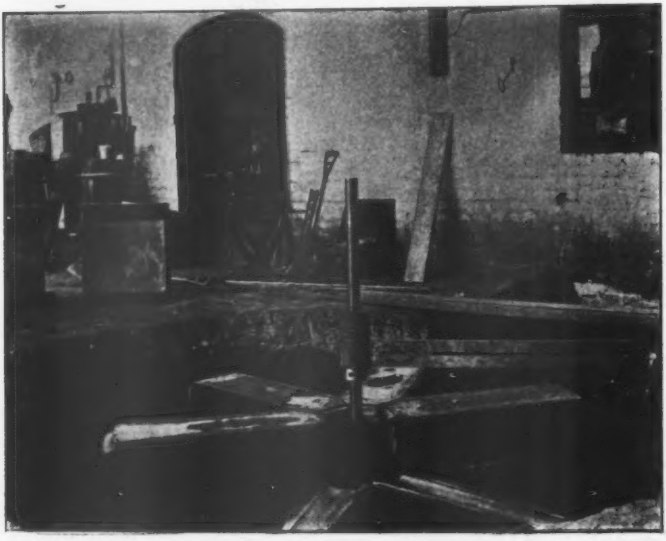

Fig. 6. Mold for Fly Wheel.

Fig. 7. Mold for Fly Wheel.

Fig. 8. Mold for Fly Wheel.

wheel is 72 inches diameter, weighed about 2,800 lbs., and is being finished in the machine shop.

The College of Engineering provides instruction in the following branches: Architecture, Architectural Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, Municipal and Sanitary Engineering, Railway Engineering.

Students in all of the above courses, except the first two, are required to do shop work during their first year to the amount of nine hours per week. Instruction in wood work covers a period of eighteen weeks; in forge work, nine weeks; in foundry practice, nine weeks. Only students in Electrical and Mechanical Engineering courses are required to do shop work in the second year. These students work in the machine shop seven and one-half hours per week during the entire school year.

An estimate of the total number of hours each student receives shop instruction will show that but little time is really given to it, and that but little more than the principles and theory can be taught. Owing to this their work in the foundry is of necessity largely exercise work designed to illustrate the principles of molding, involving the use of patterns, sweeps and cores in making green and dry sand molds. Each student is also taught to care for the cupola, to make it ready, to charge it, and to tap and pour the iron. A considerable amount of repair work from other departments of the University comes to the foundry, very much as does work to a small jobbing foundry. Students do as much of this work as possible. At times more work comes than can be handled by the foreman and the inexperienced students. In such a case a molder is hired for a time to assist the foreman. The foreman is a man who has had a number of years' experience in commercial foundries.

After the students have gone through a course of shop instruction, it is not expected that they will be pattern makers, molders or machinists. However, they are encouraged to become as proficient as possible, and many students have done very good work in commercial shops after two years' instruction in shop practice. The main object of the College is to train engineers. It has been found best to put shop instruction on the same basis as mathematics, literature, chemistry and other subjects that are helpful to engineers. A considerable number of students obtain employment in shops during vacations and thus

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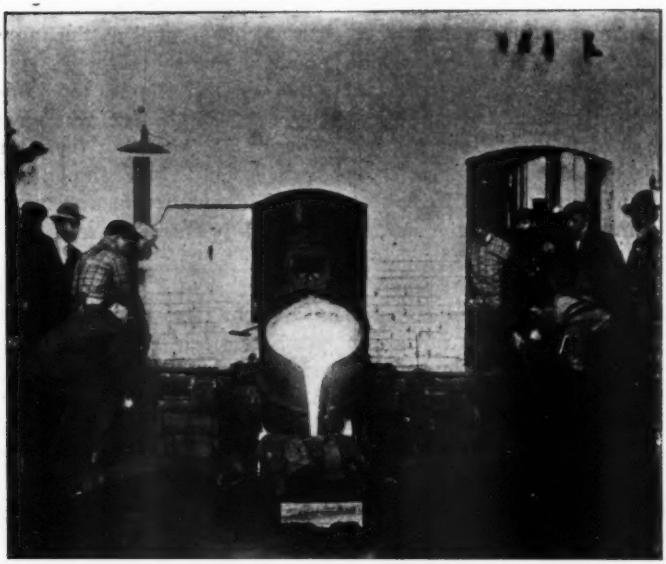

Fig. 9. Pouring Fly Wheel.

Fig. 10. Class in Foundry Practice.

earn money for the following year at college, and at the same time round out the knowledge gained in the school.

Besides the students taking the regular course, the University provides for men over twenty-one years of age, who have the ability to take the work they desire, by admitting them for special work in any branch of engineering. For example, if a young man desired to perfect himself in foundry management, he might make arrangements to do work in chemistry and foundry practice only.

At first thought it may seem that a school foundry ought to do a great deal of experimental work. But when one considers that the duty of the foreman is to teach classes of young men who come to him with no knowledge of the foundry and are to receive instruction during a period of nine weeks only, it is clear that all his energies must be given to instructional work. Students in the senior class are encouraged to take up problems in the foundry for thesis work. Recently, for the first time, two students have expressed a desire to do experimental work and make a special study of foundry practice next year. During past years, as well as present, there has been a greater demand for technical men than could be supplied; but of these requests few ever came from the foundries. Prospects of employment have not been good enough to warrant engineering students to specialize in foundry work. If the foundries need technical men and are willing to offer the same inducements that other engineering enterprises do, a fair proportion of engineering students will give attention to that branch of work.

Just at present the University has no testing laboratory, owing to loss by fire last June, but it is confidently expected that a new laboratory will be provided before work begins next fall. A Foundry Record sheet has been prepared for use in the foundry and partial records are being made. It is hoped to make the records complete as soon as the new laboratory is completed. The form of this blank is shown in Fig. 11.

The Mechanical Engineering Department will be glad to aid in advancing the foundry interests, and will look upon any suggestions to that end from foundrymen as additional encouragement to do so.

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MECHANICAL ENGINEERING DEPARTMENT SHOPS
UNIVERSITY OF ILLINOIS

FOUNDRY RECORD

Heat No._____ Date_____

Make of Cupola_____ Size of Cupola_____

Make of Blower_____ Size of Blower_____

Fire started_____ Blast put on_____ Bottom dropped_____

First iron charged_____ First fluid iron appeared_____ Blast in inches_____

Pig iron used { Kind_____ No._____
Analysis_____

Scrap iron used { Kind_____ No._____
Analysis_____

Coke used { Kind_____
Analysis_____

Flux used—Kind_____ Quantity_____

	Coke.	Pig Iron.	Scrap Iron.	Weighed by	Remarks.
1st charge					
2d charge					
3d charge					
4th charge					
Totals					

Total weight of iron melted_____ Ratio of iron melted to coke used_____

Weight of good castings_____ Weight of poor castings_____

Weight of sprues, gates, &c_____ Weight of iron lost in melting_____

Per cent. of iron lost in melting_____

General description of castings made—size, shape, weight, &c._____

Test bar, { Analysis_____
Transverse test—size_____ c. to c._____ Result_____
Tensile test—size_____ Pounds per square inch_____
Hardness. By cutting or drilling_____
Microscopic features_____

Remarks—

Fig. 11.